INDEX.

ABBREVIATED telegram addresses, 255
Absolute electrometer giving continuous indications, 370
,, spherical electrometer, 418
Accident to Mr. J. Aylmer, 36
Accumulator plates, 257
Accumulators, The transport of, 80
Adelaide Jubilee Exhibition, 554
Admiralty survey, 310
Alleged fraud by an electrician, 38
,, libel on Mr. Hugh Watt, 400, 579, 601
Alternating currents and their part in electro-technics, 133, 157
American arc lighting industries, 452
,, electric plant, The first, 256
,, National Electric Light Association, 191, 210, 252, 276
,, newspapers, Electrical subjects in, 61
,, papers on electrical subjects, 216
,, telephone patents, 14, 60, 89, 91, 146, 192, 225, 275, 553
Ampèremeter, A simple, 481
Ancient electric locomotive, 356
Anglo-American Brush Corporation, 121
,, ,, Telegraph Company, 61
Another death from electricity, 380
,, fatal accident, 80
,, searcher rewarded, 579
Antwerp Exhibition, The tramcars at the, 101
Aperiodic galvanometer of Deprez-d'Arsonval, employed as a ballistic galvanometer, 551
Apparatus for reproducing at pleasure an invariable quantity of electricity, 424
,, for verifying the manufacture of electric fuses, 543
Appeal on behalf of a much-valued servant, 256
Application of springs to polarised telegraph instruments, by K. Gulstad, 29
Appointment, An important, 60
Arago, 237
Arc lighting plants, 452
Arc secondary generators reliable, 358
Armington and Sims engines, 119
Arrest by means of the telephone, 427
Atmospheric observations, 401
Aurora Borealis, 62
Australian papers please copy, 309
Automatic terminal, M. de Combette's, 149
Ayrton and Perry on minimum waste and maximum economy, 325
,, ,, on the seat of the electromotive forces in a voltaic cell, 115
,, ,, on self-induction, 328
,, Perry's meters, 62

BALL dynamo, The, 217
,, electric lighting system, The, 119
Ballaarat School of Mines, 580
Balloon signalling system, Mr. Bruce's, 102
Barnes's friction clutch pulley and cut-off coupling, 205
Batteries, Galvanic, 39
,, Primary, 102, 169, 513, 569, 601
,, Running down of, by Oliver J. Lodge, 136
,, for scarf pins, 204
,, Secondary, 194, 205, 334
,, cells, Improved, 281, 309
Battery, Chloride of silver, 580
,, efficiency, Secondary, 123
,, The Lee-Chaster, 269
,, solution, A new depolarising, 38
Bell Telephone case, The, 60, 91, 146, 595
,, telephones, The manufacture of, 601
Bernstein lamps, 581
Berry, Ernest L., on the electric light at the Prince's Theatre, 250
Bichat and Blondlot, MM., on an absolute electrometer, 370
Birmingham steam tram, Fatal accident with the, 215
Blackpool tramline, The, 101, 195, 308, 424, 428
,, ,, Complaints against, 195
Blasting operations, Great, 400
Blaze, A powerful, 58
Bleaching by electricity, 114, 144, 570, 602
Blondin outdone, 38
Blondlot and Bichat, MM., on an absolute electrometer, 370
Bravery, Recognition of, 120
Brighton electric railway, 169, 193, 553
British Association, 81, 451
Brooks, David, on some considerations regarding induction, 54
Bruce's balloon signalling system, 102
"Brush," The newest, 453
Brush cut-out, The, 600
Burglar alarms, 357
Buried miners, Finding, 569

CABLE between America and Australia, Proposed, 102
,, to Australia, Direct, 280
,, broken, 335, 378, 450, 481
,, charges, German, 426
,, companies' receipts, 523
,, ,, reserve funds, 23
,, competition in the Atlantic, 378
,, conference, 454, 462, 479, 507
,, The Fastnet Light, 310
,, Fouling an ocean, 507
,, the French Atlantic, Another fracture of, 450, 479
,, inspection, 399
,, Laying a, 12, 34
,, New South Australian, 402
,, ,, Zealand-Australia, The proposed, 600
,, news, 147
,, ocean telephone, Size for an, 334
,, Persian Gulf, The new, 95
,, Proposed trans-Pacific, 148
,, rate-cutting war, 399
,, rates, 378, 426, 584
,, record beaten, 147
,, revenues, 513
,, rupture in deep water, 481
,, ship *Buccaneer*, 308, 379
,, The Singapore-Penang, 399
,, The West African, 103, 225, 233, 523
,, ,, India and Panama, 450
,, working, An improved method of, by J. Ebel, 390
Cablegrams, Charge for press, 37
Cables, Atlantic, 15, 378
,, Australian, 479
,, More Anglo-American, 60
,, Proposed new, 282
,, Saved by the Commercial, 282
,, submarine, The protection of, 37, 334, 479
Canadian telegraph lines, 601
Carbon conductors in glow lamps, 581
Carbonisation of iron, 333
Carbonising lamp filaments, 507
Carhart, H. S., on surface transmission of electrical discharges, 465
Cells for accumulators, 452
Central station electric lighting in America, 122
,, ,, ,, ,, at Tours, 270
Characteristics of alternating current dynamos, 217
Charge and discharge indicator for secondary batteries, 205
Charges for Press cablegrams, 37
Charging secondary batteries, 194, 334
Cheaper telegraphy, 553
Chloride of silver battery, 580
City and Guilds of London Institute, 217, 428

CITY NOTES—
Anglo-American Brush Electric Light Corporation, 124, 151
,, ,, Telegraph Company, 107, 125, 150, 336
Anglo-American Telegraph Company Shareholders' Association, 40
Australasian Electric Light, Power, and Storage Company, 582
Brazilian Submarine Telegraph Company, 106, 107, 219, 429, 455, 556
Brighton Electric Light Company, 286
British Electric Light Company, 603
Consolidated Telephone Construction and Maintenance Company, 456, 526, 583
Cuba Submarine Telegraph Company, 107, 123
Direct Spanish Telegraph Company, 258, 285
,, United States Cable Company, 63, 104, 336
Eastern Extension, Australasia and China Telegraph Company, 312, 336, 358, 603
,, and South African Telegraph Company, 20
,, Telegraph Company, 63, 103, 126, 287, 383
Edwin Fox and Company, 126
Electrical Power Storage Company, 286, 310
German Union Telegraph Company, 83, 107, 172, 258, 285
Globe Telegraph and Trust Company, 83, 312
Great Northern Telegraph Company, 172, 219, 336, 456
Gülcher Electric Light and Power Company, 19
Hammond Electric Light and Power Supply Company, 63
India Rubber, Gutta Percha and Telegraph Works Company, 126, 152, 197, 238, 312, 430
Indo-European Telegraph Company, 335, 383, 404
International Electric Company, 63
Lancashire and Cheshire Telephonic Exchange Company, 219
,, Maxim-Weston Electric Company, 107
Liverpool Electric Supply Company, 239
London Platino-Brazilian Telegraph Company, 219, 526, 584
Maxim-Weston Electric Company, 83, 124, 126, 172, 199
National Company for the Distribution of Electricity by Secondary Generators, 239, 258, 285
,, Telephone Company,
Oriental Telephone Company, 382
Phosphor-Bronze Company, 152
Railway and Electric Appliances Company, 402
Reuter's Telegram Company, 383, 404
River Plate Telephone and Electric Light Company, 287
South African Brush Electric Light and Power Company, 603
Submarine Cables Trust, 429, 455
,, Telegraph Company, 126, 171
Swan United Electric Light Company, 200, 283
Telegraph Construction and Maintenance Company, 152, 200, 218
Telephone Company of Austria, 126, 152
,, ,, ,, Egypt, 258
United Telephone Company, 556
Volta Electrical Company, 41
West African Telegraph Company, 359, 556
,, Coast of America Telegraph Company, 63, 359, 509, 527
,, India and Panama Telegraph Company, 456, 509, 526
Western and Brazilian Telegraph Company, 41, 62, 105, 172, 239
,, Counties and South Wales Telephone Company, 312

CITY NOTES—*continued.*
Western Union Telegraph Company, 83, 239
Collapse of the Electric Lighting Bills, 602
Colonial telegraphs, 601
Commercial Cable Company, 553
„ efficiency of dynamo machines, Testing the, 256
„ „ „ incandescent lamps, 62
Communication with moving trains, 357
Company promotion, 508
Comparison of locomotives, automotors and tramcars worked by stored-up energy, by A. Reckenzaun, 464
Comparative study of the performance of the ring armatures of dynamo machines, 564
Competitive tests of the Edison and Weston dynamos, 4
Complaints against the Blackpool tramway, 195
Compressed air motors for electric lighting, 441
Conductors, The resistance of, 256
Conference on submarine cable protection, 571
Constant currents, 581
Convenient method of finding current, by E. C. Rimington, 371
Conversazione, 195, 580
Correction of an error in electro-dynamics, 269
CORRESPONDENCE—
American telephone patents, by Jerome Carty, 85
„ „ patents, by W. C. Barney, 240, 292, 459, 535, 561, 586
Analogies of generators and motors, by Carl T. Blanch Brain, 87
Arc and glow lamps, by Whittaker & Co., 605
Archimedes Redivivus, by "Hiero," 21
Bassano case digested, by "l'Homme qui Rit," 317
„ Slater telephone case, by "F. T. H.," 339
Bell telephone patents, by W. C. Barney, 108
Blue photos from tracings, by Alex. P. Trotter, 131
Brake H.P. of gas engines, by J. H. Greenhill, 66
Brockie-Pell arc lamp, by James Brockie, 44
Cable messages, by "Bonco," 174
Cables for the West Coast of Africa, by "A Brazilian Submarine Telegraph Shareholder," 109
Central station lighting, by Henry Turner, 534
Charge and discharge indicators for secondary batteries, by John S. Sellon, 242
„ „ discharge indicators for secondary batteries, by Henry A. Kent, 243
„ „ discharge indicators for secondary batteries, by Sir Thomas S. Bazley, 264, 366
Commercial efficiency of incandescent lamps, by Henry Crookes, 108
Compound wound dynamos in parallel, by E. W. Rice, Jun., 339
„ „ dynamos in parallel, by A. Grundy, 366
„ „ dynamos in parallel, by P. Cardew, 366
Correction, by K. Gulstad, 66
Curious contact, by C. W. and A. P. Cotterell, 21
Deprez machines, by Paget Higgs, 86
Discovery of electro-magnetism, by J. J. Fahie, 175
Distribution of electricity, by R. C. Jackson, 244
Dolbear and the telephone, by Coates and Macdonald, 263
Domestic electric lighting, by A. J. Littleton, 43
„ „ lighting, by J. H. Greenhill, 44
„ „ lighting, by G. Percival, 86
Dynamo as a generator and as a motor, by W. M. Mordey, 131
„ engines, by Alley and Maclellan, 606

CORRESPONDENCE—*continued.*
Dynamo testing, by P. Cardew, 242
„ „ „ Lord Rayleigh, 242
„ „ „ W. E. Hayne, 264
„ „ „ R. Mullineux Walmsley, 291, 365
„ tests, by Herbert W. Butler, 291
„ „ by R. E. Crompton and Co., 410
Dynamos and domestic electric lighting, by Sir David Salomons, 84, 132
„ „ domestic electric lighting, by R. E. Crompton, 109
„ „ domestic electric lighting, by P. Bedford Elwell, 132
Earth currents, by "Sttawa," 486
Economy in electrical conductors, by "E. O. W.," 410
Efficiency of the Edison-Hopkinson dynamo, by Edward Hopkinson, 339
„ per pound of copper, by Sidney F. Walker, 110
„ „ „ of copper, by Chas. Lever, 132
Electrical formulæ, by F. V. Andersen, 22, 86, 202
„ „ by W. Moon, 65
„ „ by "Ohm," 175
Electric alarms and indicators, by H. Albert, 154
„ „ „ indicators, by E. Thurkle & Co., 201
„ lamps in the Law Courts, by "Fair Play," 318
„ light at sea, by P. M. Purves, 434
„ lighting on the Spey, by Charles L. Hett, 434
„ locomotion, by Alfred Melhuish, 434
„ meter as a secondary battery indicator, by G. E. Dorman, 291
„ v. oil lamps, by Arthur E. Cotterell, 290, 318
„ „ lamps, by R. E. Crompton, 337
„ repeaters for railway signals, by W. Langdon, 486
Electricity v. heat, by James Johnstone, 433
„ by C. H. Haskins, 608
Electro-magnetic induction, by W. Moon, 154
Energy meters, by W. E. Ayrton, 339
Filaments of deposited carbon, by Alfred W. Soward and I. Probert, 585
FitzGerald secondary batteries, by "A. F.," 224
„ „ batteries, by Desmond G. FitzGerald, 242
Franklin Institute tests of dynamos, by Charles F. Heinrichs, 88, 175
„ „ tests on incandescent lamps, by Woodhouse and Rawson, 289
„ „ tests on incandescent lamps, by Wm. D. Marks, 511
Galvanic batteries, by F. Higgins, 66
Galvanometer problem, by "P. J.," 512
General distribution of electricity by continuous current transformers, by G. E. Dorman, 263
Hint to correspondents, by Sydney F. Walker, 586
How to wind magnets, by T. Bensdschuh, 486
Hughes on self-induction, by Willoughby Smith, 364, 388
„ „ self-induction, by P. Cardew, 365
„ „ self-induction, by D. E. Hughes, 407
„ „ self-induction, by Jas. Swinburne, 408
„ „ self-induction, by A. E. Conti, 409
Improvements in telephones, by W. F. S. Ashley, 512
Incandescent lamp making, by "Very Anxious," 460, 512

CORRESPONDENCE—*continued.*
Incandescent lamp making, by Heap and Stuart, 486
„ lamp making, by "Ajax," 486
„ lamp patent case, by "Ram," 536
„ lamp tests, by "Incandescence," 223
„ lamps, by W. M. Mordey, 388
„ lamps as telephones, by A. R. Bennett, 224
Intercommunications in trains, by J. D. Leach, 606
Invention of the telephone, by Alexander Melville Bell, 202
Laws of magnetism, by John Hampden, 562
Lightning conductors and Prof. Hughes's discoveries, by "Copper Tape," 223
Long distance telephony, by "Magneto," 511
„ „ „ „ A. Watts, 534
„ „ „ „ "Slabee, 534
„ „ „ „ "Telephonist," 535, 562
„ „ „ „ A. A. Campbell-Swinton, 562
„ „ „ „ Carnwath, 562
Magnetism, by "C. G. S.," 87
Meaning of diaphragm, by "Inflexible," 264
Measuring intermittent or alternating currents, by "F. J.," 387
Mechanical telephone patents, by "Telegraph Engineer," 154
„ „ patents, by "Inquirer," 241
„ „ patents, by "Acoustic," 265
„ telephones, by "Iron," 338
Military telegraphy, by "H. G. Y.," 562
New experiments on electricity, heat and light, by James Johnstone, 407
„ patents of Bell and others, by W. C. Barney, 561
„ pattern reversing key for single needle instruments, by "Perplexed," 224
„ type of dynamo, by Gisbert Kapp, 606
Otto gas engine patents, by Korting Brothers, 174
Ozone and other gas, by "A. and B." 460
Primary batteries, by J. W. Dierman, 266
„ „ „ John B. Verity, 366
„ „ „ Sidney F. Walker, 605
Private telephonic communication, by H. Aston, 202
Proofs that electricity is an element, by James Johnstone, 337, 363
Railway signalling instruments, by C. Brown, 222
Rapacity of telephone companies, by W. J. Burnside, 366
Sabine *v.* White, by James Johnstone, 460
Schanschieff's battery, by Edward Conry, 512
„ „ „ A. Schanschieff, 536, 586
„ „ „ G. Christopher Davies, 486
„ „ „ "A Maker of Primary Batteries," 561
Secondary batteries, by Sir David Salomons, 108
„ „ „ R. Mitchell, 242
„ „ as regulators, by Aug. J. Littleton, 224
„ „ „ regulators, by Bernard Drake, 240
„ „ „ regulators, by Sir David Salomons, 240, 263, 290, 339
„ „ „ regulators by R. Percy Sellon, 317
„ battery patents, by H. Dell, 21

CORRESPONDENCE—*continued.*
Secondary battery patents, by "G. B.," 459
,, ,, indicators, by P. Bedford-Elwell, 264
,, ,, indicators, by Henry A. Kent, 318
,, generators or transformers, by Charles Zipernowski, Max. Deri, and O. T. Blathy, 43, 292
,, generators, by L. Gaulard, and J. Dixon Gibbs, 338, 387
Self-induction, by "A Coil," 240
,, ,, Desmond G. Fitzgerald, 265
,, ,, "A Professor," 266
Some points in electrical distribution, by Mackenzie and Brougham, 202
Spiel's petroleum motor, by George R. Cook, 224
Suggestions as to testing the merits and life of high and low resistance incandescent lamps, by Arthur Shippey, 406
,, as to testing the merits and life of high and low resistance incandescent lamps, by Frank Bilton, 434
Telegraph cables, by "E. O. W." 154
Telegraphing to and from moving trains, by J. J. Fahie, 173
Telephone conference, by W. E. Irish, 224
,, ,, ,, "Long Distance Telephony," 264
,, matters in America, by W. C. Barney, 586
,, patents, by "H. C.," 42
,, ,, ,, "Telephonist," 132, 223, 244
,, ,, ,, "Combination," 174, 223, 265
,, ,, ,, J. W. Barnard, 201, 244
,, ,, ,, Sydney F. Walker, 244
,, ,, ,, Jno. Barrett and Sons, 244
,, ,, ,, W. C. Barney, 292
,, transmitters, by W. Holder, 606
Telephoning between ship and shore, by Harold Dowson, 410
Testimony to secondary batteries, by Sir William Thomson, 290
Tests at Messrs. Crompton's works, by Sydney F. Walker, 431
Theatre lighting, by J. R. Williamson, 291
Theory respecting faults in incandescent lamps, by A. Shippey, 241
Thompson's new telephone receiver, by "Wriggle," 512
,, Valve telephone, by A. W. Hine, 292
,, Valve telephone, by "Telephonist," 364
Transmission of power by electricity in mines, 154
Trembling bells, by T. S. and W. Taylor, 606
Two polar *v.* multipolar dynamos, by W. E. Hayne, 410
Unexplored field in electric lighting, by Edward Conry, 432
,, ,, in electric lighting, by "R. F. Y.," 459
Use of the tangent galvanometer, by "A. E.," 174

Cornell tangent galvanometer, 555
Cost of electrical power, 507
,, gas in America, 101
,, ,, Portugal, 213
Courteous competition, 235
Cowles, Eugene H., On the production of aluminum and its alloys in the electrical furnace, 182
Creil experiments, The, 3
Cremating by electricity, 280
Cricket match, 553
Crompton dynamo tests, 350, 452
Cruto lamp, 554
Curious fulfilment of a dream, 100
Cut-outs for arc lamps, 525

DAFT electric motor, The, 38, 46
Damage to telephone wires, 100
Dancer, Mr. J. B., 601
Daniell battery, 479
Decision in favour of the Bell Telephone Company, 595
De Combette's automatic terminal, 149
Decomposition of water by means of a dynamo machine, by J. Giltay, 418
De Khotinsky secondary battery, 256
Delany multiplex telegraph, 450
Depolarising battery solution, A new, 38
Deprez, M. Marcel, On an apparatus for reproducing at pleasure an invariable quantity of electricity, 424
Deprez-D'Arsonval, On the aperiodic galvanometer of, 551
Deri, Max, On alternating currents and their part in electro-technics, 133, 157
Dermatine, 454, 555
Desk, A novel, 61
Determination of melting points, 16
Determining the coefficient of self-induction, 294
Diaphragm and tension regulator, 308
Difficulties of ship lighting, 306
Dioptric glass, Trotter's, 148, 195
Dire effects of the electric light, 169
Dirigible balloons, 37
Discovered at last, 194
Dissipation of heat in wires, 357
Divining rod again, The, 149
Dolbear, Professor Amos E., On telephone systems, 140, 161
,, telephone case, The, 14
Domestic electric lighting, 1, 36, 57, 100, 120, 122, 196, 332, 505
,, ,, ,, by W. H. Preece, 297, 307
,, ,, ,, The Weston system of, 427
Drawbaugh telephone case, The, 60
Dreadful! 552
Dream, Curious fulfilment of a, 100
Drop-forged copper, 281
Dynamicables, The, 480
Dynamite accident, 524
Dynamo armatures, 555
,, ,, Comparative study of the performance of, 564
,, as a generator and as a motor, The, by W. M. Mordey, 27
,, engines, 537
,, The Ball, 217
,, ,, Crompton, 350, 452
,, ,, Goolden and Trotter, 566
,, ,, Joel, 334
Dynamo-electric machinery, 155, 193
,, ,, machines, 80
,, ,, ,, Competitive tests of the Edison and Weston, 4
,, ,, ,, by J. and E. Hopkinson, 376
,, Silvanus Thompson on the law of the, 24
,, Strange history of a, 326, 348, 375, 396, 442, 467, 503, 550, 570
,, tests, 81, 101, 148, 170, 207, 216, 230, 237, 349, 389, 452
,, ,, at Philadelphia, 81
Dynamos, The characteristics of alternating current, 247
,, Efficiency of, 251
,, Self-regulating, 435
,, Testing the commercial efficiency of, 250
,, The quantity of iron in, 356
Dynamometers, Transmission, 82

EARTH currents, 82
Ebel, J., On an improved method of cable working, 390
Ebel's improvements in telephonic apparatus, 462
Edinburgh International Exhibition, 146, 191, 257, 281, 355, 380, 428, 445
Edison-Bergmann transmitter, 379
,, central stations in America, 122
,, Marriage of, 237
,, phonoplex, or way duplex, 413
,, telephone patent in Canada, 13, 80
,, ,, transmitter, 309
Edison *v.* Woodhouse and Rawson, 453
Effect of an electric current on oscillations, 374
Effects of the "quantity" rheostatic machine, 50
Efficiency of dynamos, 251
,, of electro-motors, 80

ELECTRIC—
alarms in railway carriages, 80
arc, Transition resistance in the, 3
bells, 349
burglar alarms, 37
Carbon Storage Company of Scotland, 237
church bells, 353
clock control, 169, 427
communication between lightships and the shore, 506
,, ,, vessels at sea, 121
,, in the House of Commons, 245
conductors, 334
current, Effect of an, on oscillations, 374
currents, High tension, 580
,, The regulation of, 581
effects on the stage, 398
fire alarms, 82
furnace for producing aluminum and its alloys, by Eugene H. Cowles, 182
fuses, Apparatus for verifying the manufacture of, 543
,, for the ignition of mines, 543, 602
gun, Fatal accident with an, 333
guns, 252
hand lamp, Portable, 279, 309
head lights, 58
illumination of lighthouses, 229
lamp, A miner's, 122
launch, On the Thames in an, 423, 442
,, trial trip, 427
locomotion, 15, 81, 121, 429, 454, 480, 507, 555
,, in the States, 555, 601
,, by A. Reckenzaun, 90, 112, 138, 165, 177, 208, 232, 246, 278, 296, 323, 389
,, wanted, 355
locomotive, An ancient, 356
motor, The Daft, 38, 46
night signalling, 508
railroads in Boston, 61
railway at Brighton, 169, 193, 553
repeaters for railway signals, 373
shock, Listening for an, 453
signalling, 479
speed indicator, 8, 148
street cars, 451
tramcar in Berlin, 57
,, at Blackpool, 101, 195, 308, 427, 428
tramcars, Progress in, 379
tramway on Ryde Pier, 121, 236, 251, 256, 427, 553
,, locomotion, 402

ELECTRICAL—
apparatus, Technical, 451
appliances in the army, 508
boats for service, 580
cons., 210, 309
conductor for the transmission of power, Profitable section of an, 6
conductors, Economy in, 267
,, Forms of, 121
,, Self-induction of, 111
,, Steel-copper, 17
,, and transmitting power, 17
conferences, 524
discharges, On surface transmission of, 465
dissipation of smoke, 401
distribution, 271
,, Some points in, by Prof. Geo. Forbes, 185
elevated railroads, 602
fire alarms, 194
formulæ, 61
fountain, 282
generators, New, 451
hoist, 515, 554
measuring instruments, 602
power, The cost of, 507
purification of copper, 524
staffs for the dockyards, 427
subjects in American newspapers, 61
transmission of power, 1, 3, 47, 211, 236, 452
work in 1885, 53, 82
works in the British Museum, 452

Electrically protecting the dead, 60
,, propelled submarine boat, 325
,, ,, vehicles, 37

ELECTRIC LIGHT—
on Brooklyn Bridge, 426
Chance for the, 119
circuits, Long, 149
companies, Relations of, to insurance, by C. J. H. Woodbury, 252
Dire effects of the, 169
a failure everywhere, 525
fire-damp indicator, 587, 601
v. gas, 401, 552
and gas in America, 398
Gas companies and the, 357
at Hell Gate, 182
installation, Large, 36
installations, some switches for, 51
Investigating the, in darkness, 446
Leeds Town Council and the, 449
on the Lyceum stage, 58
in modern warfare, 213
Navigation by the, 280
at the Newcastle election, 168
Newspapers and the, 426
operations, An unexplored field in, by A. Hamilton-Church, 391
plant burnt out, 397
The poet and the, 399
on the purchase-hire system, 78
regulation, 226
at sea, 425
shares, 14
on a skating pond, 146
and telephone wires, 308
tower, Fatal fall from an, 280
in workshops, 146

ELECTRIC LIGHTING—
Act, The, 100, 121, 146, 213, 245, 254, 331, 563
,, Amendment Bills, 38, 102, 253, 301, 307, 330, 332, 334, 354, 377, 445, 452, 522, 556, 572, 597, 602
,, Committee, The, 399
of the Albany capital, 119
at the Albert Palace, 357, 449, 522
on the *Alexandra*, 600
in America, 146
at the Aquarium, 257, 477
The Ball system of, 119
of the Bar library, 213
of the Birmingham Art Gallery, 552
of the Blackpool Winter Gardens, 14
at Brighton, 478
at the British Association meeting, 478
at Brooklyn, 506
in California, 398
of carriages, 449
Central station, in America, 122
,, ,, at Tours, 270
at Chelsea, 602
in Chicago, 15, 58
of a Christmas tree, 37, 100
of a church, 100
in the City, 191, 379, 478
at Colchester, 377
Comparisons in, 237
Compressed air motors for, 441
contracts, 61, 332
in copper mines, 100
Cost of, 481
at Covent Garden Theatre, 123
and crime, 600
of the *Curlew*, 306
at Dalton, 120, 213
and detective work, 100
of the *Devastation*, 144
Domestic, 1, 36, 57, 100, 120, 122, 196, 297, 307, 332, 505, 506
,, Weston system of, 427
,, in Ireland, 506
of the *Dynamic*, 552
at Eastbourne, 551, 578
of Eaton Hall, 102
Economy of, 192
at the Edinburgh Exhibition, 146, 169, 191, 236, 545, 552, 578
of the *Edinburgh Castle*, 353
of the El Dorado Theatre, 181
of the English Bank of Rio de Janeiro, 449
of the Exeter lunatic asylum, 378
of factories, 100, 331
at the Folkestone Exhibition, 195, 521
in France, 492, 522
in Glasgow, 79, 552
of the Glasgow Athenæum, 308
and the Greek plays, 478
of Greenock harbour, 353

ELECTRIC LIGHTING—*continued*
The Government and, 310
The Gülcher system of, 353
at Hanley, Proposed, 120
at Hatfield House, 57
of Holloway College, 426
of the House of Lords, 213
of houses in Yorkshire, 35
of hotels abroad, 279
in Hull, 57, 58
of the Indian and Colonial Exhibition, 191, 332, 590
of Ingestre Hall, 119
installation, An interesting, 138
of ironworks, 78
at the Inventions Exhibition, 145
at Kimberley, 191
of the *Landrail*, 306
Large isolated plant of, 120
at the Law Courts, 307, 449
Lectures on, 334
in the Leeds Town Hall, 14, 235
of lighthouses, 206
of the Liverpool Exhibition, 234
of Lloyds, 238, 522
of the Manchester Art Gallery, 58
in Middlesborough, 14
at Middleton, 36
in Milan, 146, 506
in mills, 45, 275, 424
of Milwaukee bridges, 254
of mines, 331
of the *Miranda*, 353
of museums, 254
of the National Gallery, 235
in the Navy, 100, 119, 168, 196, 353, 398
New book on, 452
in Newcastle, 600
in New Orleans, 331
of a New York wholesale house, 119
in Oxford Street, 146
at Paddington, 308, 469, 506, 600
of a Parisian library, 398
of pianos, 58
of a pleasure yacht, 307
of the Portsmouth Town Hall, 478
of the Post Office Savings Bank, 191
from primary batteries, by Allan V. Garratt, 212
at the Prince's Theatre, 250
of private houses, 5
Railway, 216, 235, 254, 578
in rolling mills, 235
in Rouen, 280
at the Royal Holloway College, 592
in Russia, 145
for San Francisco, 600
scheme abandoned, 213
by secondary generators, 282
and ship building, 214
of ships, 58, 78, 103, 114, 213, 279, 398, 522
,, Difficulties in the, 306
of shops, 14, 18, 600
on Speyside, 399
on the stage, 145
of a station at Edinburgh, 58
,, ,, Glasgow, 59
of steam boilers, 120
at Stockport, 353
system, The Ball, 191
,, The Gülcher, 353
,, The Thomson-Houston, 57, 89, 191
in the Straits Settlements, 78
in Sweden, 578
at Taunton, 82, 354
Temporary, 57, 425, 506, 522
for temporary exhibitions, 119
of the Theatre Français, 280
The Thomson-Houston system of, 57, 89, 119
of the Tilbury Docks, 378
in a tobacco manufactory, 522
of towns in Sweden, 578
in the Turkish navy, 78
Use of water power for, 23, 36
in the United States, 146
of the *Victoria*, 556
in Vienna, 280, 522
of the Wallasey steamers, 58
at Wentworth Castle, 553
in West London, 120
in workshops, 146
on yachts, 82

Electrician, Alleged frauds by an, 38, 147
,, Honours for an, 580
,, The shooting of an, 380

ELECTRICITY—
analysed, 451
Another death from, 380
Bleaching by, 114, 144, 570, 602
Cremating by, 280
for elevated railroads, 101
Extracting metal by, 587
and fire, 603
and gas, 79, 427
on a Japanese cruiser, 355
Killing dogs by, 400
is life, 281
and manufactures, 589
in mines, 341
as a motive power, 308
in the navy, 14, 255, 309, 333, 427, 452, 479, 496, 544
New use for, 279
in shipbuilding yards, 379
Static, 18
on the *Takachiho Kan*, 444
Type setting by, 149
Working guns by, 169

Electro-dynamics, Correction of an error in, 269
,, magnet, Silvanus Thompson on the law of the, 24
,, magnets in compound machines, 178
,, meter, Absolute spherical, by M. Lippmann, 418
,, ,, ,, giving continuous indications, 370
,, motive force, Fall of, with discharge of a battery, 226
,, motors, Efficiency of, 80
Emission of light, The, 581
Engines, Dynamo, 537
English telephone patents, 293
Etève engine, The, 102, 309
Etève-Humes petroleum engine for launches, 577
Every builder his own electrician, 454
Examination papers, 581
Exchange Telegraph Company and the Stock Exchange, 38
Exhibition, Adelaide Jubilee, 554
,, at Edinburgh, 146, 169, 191, 236, 257, 281, 355, 380, 428, 445
,, ,, Folkestone, 195
,, Indian and Colonial, 191, 237, 334, 411, 424, 480, 523
,, at Liverpool, 234, 399
Experiments in self-induction, 355
,, with tramway motors, 72, 97
,, ,, the telephone, 235
Explosion, Serious gas, 555
,, of an underground conduit, 334
,, in a Leith flour mill, 355
Extracting metal by electricity, 587

FALL of electromotive force with discharge of a battery, 226
Fatal accident, Another, 80
,, ,, with the Birmingham steam tram, 215
,, ,, ,, an electric gun, 333
,, carelessness, 282
,, fall from an electric light tower, 280
,, ,, ,, a telegraph pole, 553
,, gas explosion, 257
"Father Petroleum," 555
Festivities, 16, 60
Field magnets for dynamos, 101
Filament, A new, 146
,, The meaning of, 579
Finding buried miners, 569
Finsbury Technical College, 556
Fire alarms, 82, 102
,, appliances at the Edinburgh Exhibition, 553
,, at the Liverpool telephone exchange, 380
,, damp indicators, 581, 587, 601
,, Electricity and, 603
Fires at electrical works, 101
FitzGerald, Desmond G., on "self-induction," 272
FitzGerald's secondary battery, 256
Folkestone exhibition, Electric lighting of the, 195, 521
Forbes, Prof. George, on some points in electrical distribution, 185
Foreign competition, 80
,, telegrams, 581
Franklin Institute incandescent lamp tests, 1, 61
Free telephonic communication, 450
French Academy of Sciences, 12
,, submarine cable works, 453

French telegraph department, Reform in the, 302, 310
Friction and clutch pulley, Barnes's, 205

GALVANIC batteries, 39
„ and magnetic appliances, 281
Galvanometer problem, 480
Galvanometers, Improvements in, 344
Garratt, Allan V., on lighting from primary batteries, 212
Gas in America, Cost of, 101
„ companies and the electric light, 357
„ *v.* electricity, 195, 427
„ engine and dynamo, 333
„ „ "Le Simplex," 440
„ engines, 257
„ „ The performance of, 37
„ explosions, 121, 257, 555, 579
„ lighter, A novel, 18
„ lighting for ships, 168
„ not infallible, 123
„ in Portugal, Cost of, 213
Gauging of voltmeters, The practical, 46
Gaulard and Gibbs system, 61
Generators and motors, 227
Generous gift, A, 120
German Edison Company for Applied Electricity, 427
Giltay, J., on the decomposition of water by means of a dynamo machine, 418
Good showing for a primary battery, 554, 582
Goolden and Trotter dynamo, 566
Gordon method of lighting, 601
Goubet's submarine boat, 516
Government control, Is it the effect of, 190
„ and electric lighting, The, 310
„ or private control, 381
„ telegraphs, 203
Gramme patents, The, 169
Gravet slide rule, 102
Gray's telephone, 120
Great Eastern, The, 427
Gülcher electric lighting system, The, 353
Gulstad, K., on the application of springs to polarised telegraph instruments, 29
Gümpel, C. G., on self-induction, 419, 438
Guthrie's telephone, 399

HAMILTON-CHURCH, A., on an unexplored field in electric light operations, 391
Heartless inventor, A, 580
Heat in wires, The dissipation of, 357
Heating and cooling of insulated conductors, 356
He found it, 121
Hering, Carl, on how to wind magnets, 228, 248, 341, 411, 436, 488, 514, 540
Hoist, An electrical, 515
Holmes-Burke primary battery, The, 257
Honours for an electrician, 580
Hopkinson, J. and E., on dynamo-electric machines, 376
Hopkinson's electrical hoist, 515, 554
Howard and Haig's press buttons, 140
How to elude payment, 524
How to wind the magnets for shunt, series, or compound machines, 228, 248, 341, 411, 436, 488, 514, 540, 555
How Tyarsome, 80
Hughes, Prof., on self-induction of an electric current, 122
„ „ „ self-induction of an electric current, by Prof. H. F. Weber, 321
Human body, The, as a conductor and as an electrolyte, by Dr. W. H. Stone, 344, 393, 415

IMITATION telegrams, 120
"Impracticable and unprofitable," 16
Improved battery cells, 281
Improvements in galvanometers, 344
„ „ telephonic apparatus, 462
Incandescent lamp patents, 446, 470, 487, 496, 518, 539, 545, 555, 573, 576
„ „ tests, The Franklin Institute, 1, 61, 133, 282
„ lamps, 402
„ „ Commercial efficiency of, 62
„ „ Life of, 580
„ „ in mines, 378
„ „ underground, 523
Incandescence lighting, 319, 489
Inclines on tramlines, 308
Indian and Colonial Exhibition, 191, 235, 334, 411, 424, 480, 523, 591, 602
„ patents, 17
„ telegraph department, 196
Induction, On some considerations regarding, by David Brooks, 54
Industries, 453
Influence machine, Wimshurst's, 491
Intercommunication and break-away signals in trains, by Thomas Paul, 465
International Cable Company, 579, 600
„ Railway Exhibition, 453
Invention, An important, 122
„ of the quadruplex telegraph, 79
„ „ telephone, 59
Iron in dynamos, The quality of, 356
Insulated conductors, The heating and cooling of, 356
Is it the effect of Government control, 190
Italian telegraphs, 79

JABLOCHKOFF Company, The, 146
„ and General Electricity Company, 554
Jamin, Jules, 177
J. D. F. Andrews & Co., 61
Joel dynamo, The, 334
Judgment in the telephone case, 302, 352

KILLING dogs by electricity, 400
"Knock-over" switch, The, 565
Kolkin, N., on the effect of an electric current on oscillations, 374

LAYING a cable, 12, 34
Law of the electro-magnet and the law of the dynamo, Silvanus Thompson on the, 24
Lead given to brushes, The, 555
Leads, non-inflammable, 357
Lecture on electric locomotion, 253
„ „ electricity, 148, 283
Lee-Chaster motor and battery, 269

LEGAL—
Anders *v.* Schofield, 167
British Electric Light Company, 118, 167
Blundell *v.* Gülcher Electric Light and Power Company, 278
Crossley Brothers *v.* Littleton, 305
Edison and Swan Electric Light Company *v.* Woodhouse and Rawson, 446, 470, 496, 518, 545, 573
Gilman *v.* Gülcher Electric Light and Power Company, 331
Grosvenor Gallery lighting, 119
International Electric Company, 167
Maxim-Weston Electric Company, 145
Otto engine in Germany, The, 166
„ *v.* Steel, 167
„ *v.* Sterne, 119
Pall Mall Electric Association, 118, 145
Schofield *v.* Anders, 167
Siemens Brothers & Co. *v.* Assessment Committee of Woolwich Union, 167
United Telephone Company *v.* Bassano and Slater, 197, 302, 352
„ „ „ *v.* Donohoe, 145
„ „ „ *v.* Fleming, 277
„ „ „ *v.* Waltermann & Co,, 197
Universal Electric Company, 278
West African Telegraph Company, 167
Libel on Mr. Hugh Watt, Alleged, 400, 579, 601
Life of incandescent lamps, 580
Light, A new, 18
„ obtained from incandescent filaments,
„ of other days, 123

Lighting Apparatus Exhibition, 145
„ of the House of Commons, 254
„ up a thigh bone, 147
Lighthouse experiments, 334
Lighthouses, Deep sea, and telegraph stations, 77
„ Electric illumination of, 229
Lightning arresters, 463
Lightning conductors, 356
„ „ in Philadelphia, 16
Lippmann, M., on an absolute spherical electrometer, 418
Listening for an electric shock, 453
Literary majority, A, 236
Liverpool Exhibition, Electric lighting of, 234, 399
„ Free Public Library, 334
Local authorities and telephone wires, 255
Lodge, Oliver, on the running down of batteries, 136
Long electric light circuits, 149
Longfellow on lightning, 401

MACHINERY in mines, 111
Machines for the electrical transmission of power, 1
Magnetic screens, 320
Magnetising watches, 480
Magnetism, by Willoughby Smith, 8, 31, 47
Magneto-generator key, A, by Samuel Vyle, 544
Magnets for shunt, series and compound machines, How to wind, 228, 248, 341, 411, 436, 488, 514, 540
Manufactures, Electricity and, 589
Marriage of Mr. Edison, 237
Maxim-Weston Electric Company, 280, 307
Meaning of filament, 579
Memorandum upon the Electric Lighting Act Amendment Bill, 253
Mercadier, M. E., on telemicrophonic apparatus, 209
Meters of Profs. Ayrton and Perry, The, 62
Meucci telephone, 378
Mill lighting by electricity, 45, 275
Military apparatus for electric lighting, 544
„ use of the telephone, 378
Miners' electric lamp, 122
Minimum waste and maximum economy, by Profs. Ayrton and Perry, 325, 333
Monarch of the ocean, 507
Moon, W., on pneumatic telegraph tubes, 180
„ „ „ the work performed in telegraphing, 203
Mordey, W. M., on the dynamo as a generator and as a motor, 27
Motor-armatures without iron, 81
Motor and battery, The Lee-Chaster, 270
Motors, Generators and, 227
Multum in parvo, 193
Mysterious death, 60

"NANIWA KAN," The, 379
National Electric Light Association, 191, 210
„ Gallery, Opening of the, after nightfall, 279
Navigation by the electric light, 280
„ of the Suez Canal, 480

NEW COMPANIES REGISTERED—
Alfred Slatter and Company, 455
Bradford Mutual Electric Lighting Company, 582
Bright Platinum Plating Company, 556
Brilliant Incandescent Lamp Company, 455
British and Colonial Dermatine Company, 454
Byng Telephone Company, 217
Colchester Electric Light and Power Company, 509
Continental Etève Engine Company, 18
Electro Metal Extracting, Refining, and Plating Company, 603
E. T. Syndicate, 335
Gas and General Works Company, 149
„ and Light Company of Portugal, 170
Hirsch, Greystock and Company, 171
Hydrogen Amalgam Company, 429
International Cable Company, 18
J. E. H. Andrews and Company, 197
Kensington Court Electric Lighting Company, 556
Kinta Alluvial Tin Company, 509
Leslie Liardet, Limited, 382
Loeb Chemical Electric Light Company, 525
Miner's Electrical Safety Lamp Company, 382
Railway Electric Lighting Company, 217
Self-Winding and Synchronising Clock Company, 509
Shipping Appliances Company, 382

NEW COMPANIES—*continued.*
Simplex Electrical Syndicate, 170
Smith and Chamberlain, Limited, 335
Standard Time and Telephone Syndicate, 149
Sussex Electric Light Company, 509
Westminster Joint Stock Syndicate, 335
Woodhouse and Rawson Electric Contract and Maintenance Company, 454
Woodhouse and Rawson Electric Supply Company, 103
New book on electric lighting, 453
„ depolarising battery solution, A, 38
„ electric fuses for the ignition of mines, 543
„ engine, A, 40
„ filament, A, 146
„ light, A, 18, 426
„ Persian Gulf cable, 95
„ resistance with bi-resistance coils, A, 45
„ telephone, The, 214
„ turbine, A, 237
„ York underground wire commission, 121, 602
Newest "Brush," The, 453
Newspaper science, 379
Night passage of the Suez Canal, by V. Stephen, 392
Non-inflammable leads, 357
Nordenfeldt's submarine boat, 195
Northern District Telephone Company, 332, 508
Norwegian Patent Act, Abridgment of the, 398, 401
Nothing like leather, 444
Novel gas lighter, A, 18

OBITUARY—
Brittan, John, 427
Guerout, Auguste, 237
Harrison, Sir George, 16
Jamin, Jules, 177
Richardson, George, 61
Tribe, Alfred, 34
Observatory, A projected, 479
Ocean currents, 170

OFFICIAL RETURNS OF ELECTRICAL COMPANIES—
African Direct Telegraph Company, 582
Alfred Slatter and Company, 481, 603
Anglo-American Brush Electric Light Corporation, 481
Atlas Electric Appliances Company, 196
Brighton Electric Light Company, 62, 335
Bright Platinum Plating Company, 603
Brilliant Incandescent Lamp Company, 481
British and Colonial Dermatine Company, 481
„ Electric Light Company, 103
Buenos Ayres Electric Light Company, 40
Byng Telephone Company, 238
Chelsea Electricity Supply Company, 283
Consolidated Electric Company, 62
Continental Etève Engine Company, 83, 123, 218
Cordner, Allen and Company, 582
Davis and Timmins, 238
Eastern and South African Telegraph Company, 171
Edwin Fox and Company, 358
Electrical Power Storage Company, 103, 402
Electric Lighting Supply and Fitting Company, 402
„ Locomotive and Power Company, 103, 335, 402, 455
„ Manufacturing Company, 335
„ Portable Battery and Gas Igniting Company, 525
„ Recuperative Gas Lamp Company, 556
Elwell-Parker, Limited, 358
E. T. Syndicate, 382
Fischer Electro-Amalgamator Company, 196, 382
Gülcher Electric Light and Power Company, 62
Hirsch, Greystock and Company, 196, 335
International Cable Company, 582
„ Electric Company, 217, 258
Jarman Electrical Company, 257
J. E. H. Andrew and Company, 238
Laing Electric Light and Power Company, 196, 402

OFFICIAL RETURNS—*continued.*
Lancashire and Cheshire Telephonic Exchange Company, 19
Latimer Clark, Muirhead and Company, 402
Liverpool Electric Supply Company, 335
Loeb Chemical Electric Light Company, 525
London and Globe Telephone and Maintenance Company, 123
Manchester and District Edison Electric Light Company, 358
Maxim-Weston Electric Company, 196, 257
Miners' Electric Safety Lamp Company, 402
National Company for the Distribution of Electricity by Secondary Generators, 382
New Electro-Amalgamator Company, 123
Northern District Telephone Company, 83
Oriental Telephone Company, 481
Parker's Electric Wire Corporation, 310
Phosphor-Bronze Company, 382
Pocklington New Lighting Company, 257
Primary Battery Company, 509
Railway Electrical Contractors, 171, 196
„ and Electric Appliances Company, 481, 509
„ Electric Lighting Company, 238
River Plate Telephone and Electric Light Company, 603
Self-Winding and Synchronising Clock Company, 525
Spanish National Submarine Telegraph Company, 171
Shipping Appliances Company, 402
Simplex Electrical Sydicate, 218, 257
Single Wire Multiple Telephone Company, 123
Sir Coutts Lindsay and Company, 455
Standard Electric Light and Power Company, 238
„ Time and Telephone Company, 150, 582
„ „ „ „ Syndicate, 171
Swan Electric Light Company, 382
„ United Electric Light Company, 603
Swansea Telephone Exchange Company, 283
Telegraph Improvement Company, 40
Telephone Company of Austria, 103
„ „ of Egypt, 358
Telpherage Company, 603
United Telephone Company of the River Plate, 83, 123, 402
Varley Electric Patents Proprietory, 335
Welsbach Incandescence Light Company, 509
West African Telegraph Company, 150, 218
„ London Electric Lighting Company, 171, 217
Western Counties and South Wales Telephone Company, 429
Westminster Joint Stock Syndicate, 481
William Elmore, Limited, 83, 217
Woodhouse and Rawson Contract and Maintenance Company, 481
„ „ „ Electric Supply Company of Great Britain, 481, 556
W. T. Henley's Electric Light and Power Company, 83
"Oh, you are, you are," 282
"Oh, woodman, spare that tree," 195
Oil as a fuel, 38
On the Thames in an electric launch, 423, 442
Oppermann failure, The, 429
Opportunity, An, 480
Oriental Telephone Company's claim for royalty, 553
Overhead wires, 45, 56, 61, 62, 102, 121, 212, 236
„ wires, Strong plea for, 602

PADDINGTON electric lighting installation, The, 308, 469, 506
Palace of Delight, The, 16, 71, 81
Patent Office, The, 38
„ „ library, 580
Patents in 1885, 38, 39
„ Indian, 17
„ The Gramme, 169
Paul, Thomas, on intercommunications and breakaway signals in trains, 465
Performance of gas engines, 37
Permanent communication with trains in motion, 368
Perpetual motion again, 554
Perry and Ayrton on minimum waste and maximum economy, 325
„ „ on the seat of the electromotive forces in a voltaic cell, 115
„ „ on self-induction, 323
„ and Ayrton's meters, 68
Persian Gulf cable, The new, 95
Petroleum engine for launches, The Etève-Humes, 577
„ engine, Spiel's, 137
„ engines, 402
Philadelphia pole tax, 398
"Phonoplex" or "way-duplex," The Edison, 413
Photographic literature, 507
Photography by lightning, 382
Pneumatic telegraph tubes, by W. Moon, 180
Pocket primary batteries, 169
Polarised telegraph instruments, The application of springs to, by K. Gulstad, 29
Pole frightened the wall, The, 101
Portable electric hand lamp, 279, 309
Postmaster-General of South Australia, The, 214
Powerful blaze, A, 58
Power required for the elevated railways, 81
Practical gauging of voltmeters, The, 46
Preece, W. H., on domestic electric lighting, 297
Press buttons, Howard and Haig's, 140
Price of descriptive articles, 451
Primary batteries, 102, 169, 513, 601
„ „ Good show for a, 554, 582
„ „ The Holmes-Burke, 257
„ „ The Upward, 569, 592, 602
Production of aluminum and its alloys in the electric furnace, by Eugene H. Cowles, 182
Profitable section of an electrical conductor for the transmission of power, 6
Progress in electrical tramcars, 379
„ of the telephone, 79
Propelling vessels, New method of, 16
Proper construction and maintenance of circuits, by E. R. Weeks, 210
Prosperous company, 237
Protection of submarine cables, 37, 334
Purification of copper, The electrical, 524

QUADRUPLEX telegraph, Invention of the, 79
Quality of iron in dynamos, The, 356
"Quantity" rheostatic machine, On the effects of the, 50
Queen and the telephone, The, 508

RADIANT energy, Transmitting and recording sounds by, 555
Railway Benevolent Institution, 379
„ carriage lighting, 225
„ electric lighting, 216
„ „ „ Company, 257
„ signals, Electrical repeaters for, 373
„ stations as telephone exchanges, 307
Receipts, Cable companies', 523
Reckenzaun, A., On a comparison of locomotives, automotors and tramcars, worked by stored-up energy, 464
„ „ On electric locomotion, 90, 112, 138, 165, 177, 208, 232, 246, 278, 296, 323, 389
Recognition of bravery, 120
Reform in the French telegraph department, 302, 310
Regulation of electric currents, 581
Reis telephone, The, 74, 96
Relations of electric light companies to insurance, 252
Relative cost of different sources of light, 122
Reserve funds, Cable companies', 23
Resistance of cast and pure iron, 356
Resistances of conductors, 256
Restoration of magnetism by heat, 380

Revenue returns, 334
Revenues, Cable companies', 513
Reviewer and reviewed, 281

REVIEWS—
Berly's universal electrical directory, 145
Cancer and simple tumours dispersed by electricity, by G. Edgeton, 505
Dynamo-electric machinery, by Silvanus P. Thompson, 34, 155
Electric transmission of energy, by Gisbert Kapp, 597
Electricity treated experimentally, by Linnæus Cumming, 306
Electro-deposition, by Alexander Watt, 144
Electro-technical photometry, by Dr. Hugo Kruss, 598
Elementary principles of electric lighting, by A. A. Campbell-Swinton, 595
Formulaire Pratique de L'Electricien, by E. Hospitalier, 251
Journal of the Society of Telegraph-Engineers and Electricians, 599
L'Electricité à l'Exposition Universelle d'Anvers, par Charles Mourlon, 78
Magnetism and electricity, by H. C. Tarn, 77
Note book and price list, by R. E. Crompton & Co., 505
Patents, designs and trade marks, by Abel and Imray, 505
Precautions to be adopted on introducing the electric light, by Killingworth Hedges, 252
School electricity, by J. E. H. Gordon, 190
Situation of the telephonic systems, 118
Technics of telephony, by Dr. J. Wietlisbach, 599
Theoretical-practical manual for the electrician, 377
Traité pratique d'electricité industrielle, by E. Cadiat and L. Dubost, 599

Rheostatic machine, On the effects of the "Quantity," 50
Rimington, E. C., on a convenient method of finding current, 371
Royal encouragement of science, 168
Royal Holloway College, 592
Running down of batteries, by Oliver Lodge, 136
Rupture of insulating materials, 581
Ryde electrical tramway, 121, 236, 553

SAFEGUARD against fire, 480
Salutary reprimand, 524
Schanschieff's battery, 508, 525, 555
School of Submarine Telegraphy and Electrical Engineering, 101, 479,
Science of electricity, The, 193
" in Germany, 381
" " Japan, 61
Search lights in the Navy, 145
Seat of the electromotive forces in a voltaic cell, by Profs. Ayrton and Perry, 115
Secondary batteries, 215
" " Charging, 194
" " Charge and discharge indicator for, 205
" " as regulators, 236, 247
" " Uses of, 282
" battery efficiency, 123
" " FitzGeralds, 256
" " patents, 524, 555
" " regulation, 256
" generator installations, 478
" generators or transformers, 367
Self-induction of electrical conductors, 111, 238
" " of an electric current, Prof. Hughes on, 122
" " of an electric current, Prof. Hughes on, by Prof. H. F. Weber, 321
" " experiments, 355, 381, 419, 438
" " Determining the coefficient of, 294
" " or the effects due to the electro-magnetic capacity of conductors, by Desmond G. Fitzgerald, 272
" " an increase of resistance for intermittent currents, by Profs. Ayrton and Perry, 328
Self-regulating dynamos, 435
Senegal land lines, 295
Sensible suggestion, 103
Sensophone or touch-sounder, The, 165
Ships' compasses, 556
Shooting an electrician, 380
Short account of international telegraph conventions, 461
Shortest way to a funeral, 525
Silicium bronze wire, 524
Silvertown Company, The, 356
" Visit to, 566
Simple ampèremeter, 480
Sixpenny telegram, The, 18, 113
Size of an ocean telegraph cable, 334
Smith, Willoughby, on magnetism, 8, 31, 49
Snowstorms and the wires, 39, 62, 81, 215

SOCIETIES—
East of Scotland Engineering Association, 377, 453
Glasgow Institution of Civil Engineers, 102
" Philosophical Society, 194
King's College Engineering Society, 216
New York Electrical Society, 238
Physical Society, 220, 385, 457, 533
Royal Institution of Great Britain, 17, 355
" Society, 221, 454, 457, 527, 558
" " of Edinburgh, 256
Société Internationale des Electriciens, 310
Society of Arts, 37, 356
" for the Protection of Life and Property from Lightning, 253
" of Telegraph Engineers and Electricians, 111, 112, 126, 172, 219, 257, 308, 359, 384, 483, 530
Soirée at University College, 195
Some considerations regarding induction, by David Brooks, 54
" points in electrical distribution, by Prof. George Forbes, 185
Sonnblick Observatory, 581
Sounder, A new, with bi-resistance coils, 45
Sources of light, Relative cost of different, 122
Spanish telegraphs, 367
Speed indicator, An electrical, 8
Spherical electrometer, An absolute, by M. Lippmann, 418
Spiel's petroleum engine, 137, 309
Spiral telephone wire, 215
Sporting query, 308
Standard wire gauges, 588
Static electricity, 18
Statter arc lamp, The new, 113
Steam engine tests, 195
Steel-copper electric conductors, 17
Stephen, V., on the night passage of the Suez Canal, 392
Stone, Dr. W. H., on the human body as a conductor and as an electrolyte, 344, 393, 415
Strange history of a dynamo, 326, 348, 375, 396, 421, 442, 467, 503, 516, 524, 550, 570
Strong plea for overhead wires, 602
Submarine boat, Goubet's, 516
" cables and Imperial interests, 215
" " Induction in, 214
" " The protection of, 37, 479, 571
"Substantially as described," 310
Successful inventor, A, 507
Sudden death, 427
Suggested rival to the telephone, 38
Suicide of an Australian telegraph official, 214
Supply of power, The, 18
Surface transmission of electrical discharges, by H. S. Carhart, 465
Swearing by telephone, 18
Switch, The "Knock-over," 565
Switches for electric light installations, 51

TECHNICAL electrical apparatus, 451
Telegrams, Delivery of, 192, 450
" Foreign, 581
" Imitation, 120
" insufficiently addressed, 357
" to the Royal Courts of Justice, 214
" Sixpenny, 18, 113

TELEGRAPH—
addresses, Abbreviated, 255
Another use for the, 37
in Asia, 280
in Canada, 601
at Cattedown, 601
in China, 15
clerks, Conference of, 523
conventions, A short account of international, 461
department, The French, 202, 310
" The Indian, 196
first summer meeting, 478
instruments, polarised, The application of springs to, 29
Invention of the quadruplex, 79
in Italy, 79
office at Southampton, Proposed new, 193
" " Teignmouth, New, 102
patents, American, 275
poles in dangerous positions, 60
" at Oxford, 60
revenue, 37
service, Girls in the, 193
in Siam, The, 478
in the Soudan, The, 437
stations, Deep sea lighthouses and, 77
and storms in America, The, 103
The telephone and the, 18
" " to replace the, 36
tubes, Pneumatic, by W. Moon, 180
works, Fire at, 194

Telegraphic addressess, 37, 236, 280
" communication, 602
" " in Bulgaria, 60
" " Interruption of, 15
" " wanted, 450
" facilities at Portsmouth, Improved, 120, 214
" and telephonic communication, 196
Telegraphing to and from moving trains, A new system of, 193
" the result of the division, 555
" Work performed in, by W. Moon, 203
Telegraphist killed at Clovelly, 380
Telegraphists dinner, Military, 193
" Generosity amongst, 37
" and Mr. Gladstone's birthday, 17
" Presentation of medals to, 450
Telegraphs, Colonial, 601
" French, 578
" Government, 203
" Mexican, 578
" Post Office, 170
" Spanish, 367
Telegraphy, Cheaper, 553
Telemicrophonic apparatus, M. E. Mercadier on, 209

TELEPHONE—
Arrest by means of the, 426
at athletic meetings, The, 522
in Austria, The, 59
at Bath, The, 254, 578
on board ship, 378
at Bournemouth, 214, 308
at Cardiff, 59
cable, Size for an ocean, 334
case, The Bell, 60, 91, 146, 333, 595
" The Dolbear, 14
" The Drawbaugh, 60
" Judgment in the, 352
charges, 355
combined mechanical and electrical, 354
communication in case of fire, 214
companies in America, 168
conference, Proposed, 254
contest, 334
dividends, Limitation of, 192
exchange, Fire at a, 380
" at Stirling, Proposed, 15
exchanges, Railway stations as, 307
" in Western Australia, 381
experiments with the, 235, 378
" Long distance, 255
extensions in Scotland, 79, 192, 236
as a fire alarm, 280
at fire stations, 59
at Gibraltar, 522
Gray's, 120
Guthries, 399
Invention of the, 59
at Inverness, The, 168
at Keighley, The, 36
at the Law Courts, The, 399
on lightships, The, 399, 426

TELEPHONE—*continued.*
The Meucci, 378
Military use of the, 378
Music by, 214
The New, 214
in the North, The, 62
at Nottingham, 62, 254
patent, The Edison, in Canada, 13, 80
patents, American, 14, 60, 89, 91, 146, 192, 225, 275
„ English, 293
at Plymouth, The, 149, 192
poles, Unauthorised, 79
at Portsmouth, The, 120, 426, 523
„ „ dockyard, The, 332
posts and wires, 354
at Prescot, 59
Progress of the, 79
The Queen and the, 508
and the recent riots, The, 334
The Reis, 74, 96
to replace the telegraph, The, 36
and rifle shooting, The, 281
in Scotland, The, 79, 146, 192, 236, 380, 426, 478
on a steamboat, The, 192, 214, 255
Still another, 381
Suggested rival to the, 38
in Swansea, 578
Swearing by, 18
systems, Prof. Amos E. Dolbear on, 140, 161
tariff charges, 450
and telegraph wires, 168
The telegraph and the, 18
Through the, 524
transmitter, The Edison, 309
transmitters and receivers, 343
The Valve, 355
at Whitehaven, The, 506
wires at Edinburgh, 120
Electric light and, 308
Local authorities and, 255
Overhead, 192
Underground, 426

Telephonic apparatus, Ebel's improvements in, 462
„ „ "at homes," 380
„ communication, Free, 450
„ „ v. signalling, 478, 506
„ experiments abroad, 195
„ rates, 380
„ transmitters, 333
Telephoning from moving trains, 401
Telephones, New, 354
Telephony, Improvements in, 255
„ Long distance, 478
Telpherage in America, 37
Tension regulator, Diaphragm and, 308
Testing the commercial efficiency of dynamos, 256
That lineman, 401
Thompson, Silvanus, on the law of the electromagnet and the law of the dynamo, 24
Thomson-Houston system of electric lighting, 57, 89, 119
Thomson's little siphon recorder, An improved, 555
Thunderstorm, The recent, 524
To be let, 281
Torpedo boats, 101
Torpedoes electrically steered, 237
Touch-sounder or sensophone, 165
Town electric lighting in France, 492
Trains in motion, Permanent communication with, 368, 401
Tramcars at the Antwerp Exhibition, 101
Tramway motors, Experiments with, 72, 97
Tramway traction of the future, 67
Tramways in the United Kingdom, 17
„ The working of, 481
Transformation of physical forces, 493
„ „ heat into electrical energy, 493
Transition resistance in the electric arc, 3
Transmission of power to a distance, The electrical, 47
„ „ „ by gearing, 554
„ „ „ Machines for the electrical, 1, 3
Transmitting power, Electrical conductors and, 17
„ and recording sounds by means of radiant energy, 555
Transport of accumulators, 80
Turbine, A new, 237
Type setting by electricity, 149

UNAUTHORISED telephone poles, 79
Underground wire commission, The New York, 121, 602
„ wires, 39, 426
Unexplored field in electric lighting operations, 391
Unfortunate company, An, 602
United Telephone Company, 79, 216
Unseen agent, The, 581
Upward primary battery, The, 569, 592, 602
Uses of secondary batteries, 282

VALVE telephone, The, 355
Van Depoele, C. J., on electrical transmission of power, 211
Varley Patents Proprietory, 357
Victory for the Bell Company, 381
Volk's electric railway, 601
Voltmeters, The practical gauging of, 46
Visit to Messrs. Crompton's works, 349
Visit to Silvertown, 566
Vyle, Samuel, on a magneto-generator key, 544

WARNING, 80, 335
Watches magnetised by chest protectors, 508
Water power for electric lighting, The use of, 23, 36
Watt and Joule practical units, 287
Way-Duplex, The Edison, 413
Weeks, E. R., on the proper construction and maintenance of circuits, 210
West African cable, The, 103, 225, 233
„ end riots, 147
„ London School of Telegraphy and Electrical Engineering, 216, 480, 507
Western Union methods, 55
Weston's current and energy meter, 294
„ system of domestic lighting, 427
What is a guarantee? 293
Why the Commercial Cable thrives, 426
„ electricity should be used, 121
„ not electricity, 121
Wimshurst's influence machine, 491
Wire gauges, 581, 587
Wires, The snowstorm and the, 39, 56
Woodbury, C. J. H., on the relations of electric light companies to insurance, 252
Woodhouse and Rawson, 102
„ „ „ lamps, 14, 133
Work for the unemployed, 146
„ performed in telegraphing, by W. Moon, 203
Working guns by electricity, 169
„ of tramways, 481

INDEX—SPECIFICATIONS.

1884.

DEPREZ, Marcel, and Leblanc, M. (12300), 42

LEBLANC, M., and Deprez, Marcel, (12300), 42

MEWBURN, J. C. (12300. Communicated by Marcel Deprez and M. Leblanc, of Paris), 42

WILLIAMS, J. S. (13879), 20; (16437), (16438), 405
Wynne, F., and Sellon, R. P. (13810), 20

1885.

ABEL, C. D. (7143. Communicated by Siemens and Halske), 483
„ „ (7700. Communicated by M. Lahaussois, of France), 584
Adams, H. O. (5758), 64
Allen, C. E. (15539), 289
„ W. H., Wright, R., and Kapp, G. (2776), 289; (5123), 510
Allison, H. J. (2795. Communicated by P. Benjamin, of America), 64
„ „ (13575. Communicated by A. M. A. Beale, of New York), 222
Allison, H. J. (13998. Communicated by C. Bassini and A. Heyden, of America), 222
American Electric Arms and Ammunition Company (6305), 458
Anders, G. L. (11121), 458
Armstrong, J. T. (2165), (6878), 64
Atkin, R. (597), 20
Austrian Small Arms Manufacturing Company (12551), 222

BAILLEHACHE, E. J. J. de (5404), 458
Baily, R. M., Jun., and Grundy, A. (14741), 459
Bassini, C., and Heyden, A. (13998), 222
Beale, A. M. A. (13575), 222
Benjamin, P. (2795), 64

Bennett, A. R. (5256), 289
Berly, J. A. (14288. Communicated by Z. T. Gramme, of Paris), 406
Bernstein, A. (13036), 533
Blenheim, W. (8675), 458
Botten, H. (1183), 84
Boult, A. J. (12932. Communicated by D. Rousseau, of America), 64
Bourne, H. B., and Bourne, H. R. F. (15617), 406
Boyle, R. K. (6365), 458
Brevoort, H. L., and Roberts, I. L. (3798), 64
Burdick, J. R., and Dorsett, D. H. (15078), 289
Burr, E. B. (6088), 458

CAPITO, C. A. A., and Hardt, M. P. (5494), 482
Chaster, J. E., and Lee, R. A. (992), 262
Chemische Fabrik Gössnitz, Böttiger and Seidler, and Omholt, J. (7510), 533
Clark, A. M. (6206. Communicated by the Long Distance Telephone Company, of New York), 121
" " (1785. Communicated by the Maschinenfabrik Esslingen and the Electrotechnische Fabrik Cannstatt, of Germany), 131
" " (3467. Communicated by L. Vissière, of Marseilles), 430
" " (5404. Communicated by E. J. J. de Baillehache, of Paris), 458
" " (8331. Communicated by C. R. Goodwin, of Paris), 483
" " (7881. Communicated by A. Sauer, of Germany), 511
Clarke, C. L., and Coates, H. J. (6313), 557
Coates, H. J., and Clarke, C. L. (6313), 557
Coleman, J. J. (3049), 154
Colton, E. G. (13453. Communicated by F. Haenichen, O. Haenichen, and O. Sebass, of New York), 64
" " (13451. Communicated by F. Haenichen, O. Haenichen, and O. Sebass, of New York), 222
Cooke, C. F. (8049), 458
" " and Robinson, T. (11175), 483
Cooley, H. W. and Loomis, D. P. (13011), 511
Courcelles, E., and Elu, A. (6971), 557
Courtenay, R. H. (9570), 64
Crompton, R. E. B. (2190), 362

DAVIDSON, G., Jackson, R. C., and Duncan, J. B. (3765), 363
Davies, W. H. (7694. Communicated by G. B. Scott, of Brooklyn), 557
Davis, A. L. (3332), 201
Deacon, H. W., Hurter, F., and Elmore, W. (800), 84
Delany, P. B. (8811), 511
Déri, M., and Zipernowski, C. (3379), 362
Dick, R. (3115), 337
Diener, C., and Mayrhofer, C. A. (7194), 557
Darnfeld, C. (12205), 64
Dorman, G. E. (7114), 557
Dorsett, D. H. (13109), 64
" " and Burdick, J. R. (15078), 289
Drake, B. M., and Gorham, J. M. (11699), 558
Duncan, J. B., Davidson, G., and Jackson, R. C. (3765), 363

EDARD, G. (2834), 153; (2833), 262
Edison, T. A. (7584), 511; (7583), 584
Eidsforth, R. P., and Mudford, F. J. (14851), 222
Electrotechnische Fabrik Canstatt and the Maschinenfabrik Esslingen (1785), 131
Elmore, W., Deacon, H. W., and Hurter, F. (800), 84
Elu, A., and Courcelles, E. (6971), 557
Enright, J. (1234), 84; (3553), 289
Evershed, S., and Swinburne, J. (3942), 430

FALKENSTEIN, C. K. (5420), 458
Farquharson, J., Skinner, W., and Lane, D. W. (14891), 262
Faymonville, B. (12181), 222
Ferranti, S. Z. de (3857), 363
FitzGerald, D. G. (4671), 510
Forbes, G. (1288), 42
Fraser, H. T. O. (2188), 362
Frere, N. (6971. Communicated by A. Elu and E. Courcelles, of France), 557
Frost, E. F. (15276), 406

GEMMILL, W. (4841), 458
Gilbert, A. E. (2966), 154; (15701), 430
Gisborne, C. A. (13607. Communicated by F. N. Gisborne and D. H. Keeley, of Canada), 459
" F. N., and Keeley, D. H. (13607), 459
" J. S. (311), 20
Goodwin, C. R. (8331), 483
Gorham, J. M., and Drake, B. M. (11699), 558
Gramme, Z. T. (14288), 406
Grundy, A., and Ready, G. W. (6286), 406
" " and Baily, R. M., Jun. (14741), 459

HAENICHEN, O., Haenichen, F., and Sebass, O. (13453), 64; (13451), 222
Halske and Siemens (7143), 483
Hamand, A. S., and Sarney, T. S. (2287), 64
Handford, T. J. (3358. Communicated by F. J. Sprague, of America), 64
" " (3446. Communicated by F. J. Sprague, of America), 405
" " (4468. Communicated by F. J. Sprague, of America), 430
" " (7584. Communicated by T. A. Edison, of America), 511
" " (5379. Communicated by F. J. Sprague, of America), 458
" " (7312. Communicated by F. J. Sprague, of America), 483
" " (7583. Communicated by T. A. Edison), 584
Hardt, M. P., and Capito, C. A. A. (5494), 482
Harris, H. I. (8228), 557
Hartnell, W. (3854), 363
Heyden, A., and Bassini, C. (13998), 222
Heys, W. E. (13011. Communicated by O. P. Loomis and H. W. Cooley, of America), 511
Hickie, D., and Macnab, J. (3764), 363
Higgins, F. H. W, (8540), 558
Hookham, G. (3212), 337
Hurrell, M. H. (5551), 482
Hurter, F., Deacon, H. W., and Elmore, W. (800), 84

IMMISCH, M. (6037), 482
Incledon, W. B. (562), 131

JACKSON, R. C., Davidson, G., and Duncan, J. B. (3765), 363
Jakeman, C. J. W., and Merryweather, J. C. (5679), 482
Jensen, P. (1444. Communicated by Baron von Taund-Szyll, of Graz), 42
" " (7510. Communicated by J. Omholt, of Norway, and the Chemische Fabrik Gössnitz, Böttiger and Seidler, of Norway), 533
" H. P. F., Webb, B. W., and Jensen, J. (6118), 584
Johnson, J. Y. (7222. Communicated by La Société A. Chertemps et Cie., of Paris), 584
Jones, A. E. (5847), 458
Jönsson, O. F. (3353), 64; (1853), 84; (1855), (1857), 153; (1854), (1856), 288

KAPP, G., Allen, W. H., and Wright, R. (2776), 289; (5123), 510
Keeley, D. H., and Gisborne, F. N. (13607), 459
Khotinsky, A. (8416), 511
King, A. T. (5361), 458

LAHAUSSOIS, M. (7700), 584
Lake, W. R. (3798. Communicated by H. L. Brevoort and I. L. Roberts, of America), 64
" " (13109. Communicated by D. H. Dorsett, of Chicago), 64
" " (1870. Communicated by R. Snyers, of Brussels), 153
" " (2765. Communicated by A. Marchenay, of Paris), 362
Lancaster, E. W. (2970), 362; (6608), 584
Lane, D. W., Skinner, W., and Farquharson, J. (14891), 262
Langdon, W. E. (4963), 387
Langdon-Davis, C. (4506), 362; (7799), 557
La Société A. Chertemps et Cie. (7222), 584
Lee, R. A., and Chaster, J. E. (992), 262
Lindley, H. (3121), 337
Lloyd, A. F. (14148), 222
Long Distance Telephone Company of New York (6206), 21
Loomis, O. P., and Cooley, H. W. (13011), 511
Lorrain, J. G. (2117), 63; (4541), 387
Lowne, R. M. (5547), 458
Lundberg, A. P. (2162), 64

MACKENZIE, W. J. (1621), 153
Macnab, J., and Hickie, D. (3764), 363
Macquaire, F. V., and Street, C. (9666), 221
Maquay, S. W. (15040), 459
Marris, G. (13902), 289
March, O. (3247), 337; (4141), 405
Marchenay, A. (2765), 362
Maschinenfabrik Esslingen and the Electrotechnische Fabrik Canstatt (1785), 131
Main, W. (15455), 406
Mance, H. C. (5808), (8036), 406
Mayrhofer, C. A., and Diener, C. (7194), 557
Merriam, L. P. (3888), 262
Merryweather, J. C., and Jakeman, C. J. W. (5679), 482
Mewburn, J. C. (15455. Communicated by W. Main, of America), 406
" " (6305. Communicated by The American Electric Arms and Ammunition Company, 458
Mills, B. J. B. (4771. Communicated by L. Stieringer and J. H. Vail, of New York), 387
" " (5828. Communicated by J. J. C. Smith, of America), 406.
" " (7194. Communicated by E. Diener and C. A. Mayrhofer, of Vienna), 557
Moseley, C. (4155), 289
Mudford, F. J., and Eidsforth, R. P. (14851), 222
Müller, E. A. (13279), 84
Munro, J. (8452), 558

NEWTON, C. M. (1088), 84
Neyraud, J. B. (6964), 557
Nordenfeldt, T. (3353. Communicated by O. F. Jönsson, of Stockholm), 64
" " (1853. Communicated by O. F. Jönsson, of Stockholm), 84
" " (1855. Communicated by O. F. Jönsson, of Stockholm), 153
" " (1857. Communicated by O. F. Jönsson, of Stockholm), 153
" " (1856. Communicated by O. F. Jönsson, of Stockholm), 288
" " (1854. Communicated by O. F. Jönsson, of Stockholm), 288
Nussbaum, G. A. (2395), 64

OMHOLT, J., and the Chemische Fabrik Gössnitz, Böttiger and Seidler (7510), 533

PARCELLE, A. L. (9564), 511
Parker, T. (6325), 482
Pendred, H. W. (4110), 201
Pieper, H. (4854), 387
Piot, D. T. (1281), 42
Pitkin, J. (3260), 201
Plancke, D., Van de (8538), 558
Pridham, C. W., and Upward, A. R. (7461), 406; (9302), 511

QUARTERMAN, W. H, (8733), 584

RAWORTH, J. S. (2924), 153
Ready, G. W., and Grundy, A. (6286), 406
Reckenzaun, A. (3599), 363; (5376), 584
Redfern, G. F. (6964. Communicated by J. B. Neyraud, of Lyons), 557
Robinson, T., and Cooke, C. F. (11175), 483
Roberts, I. L., and Brevoort, H. L. (3798), 64
Rose, A. V., and Rose, G. F. (3987), 201
Rousseau, D. (12932), 64
Roussy, E. L. (4286), 430
Russell, S. (3671), 289

SALAZAR, C. de (2896), 262
Salomons, D. L. (1184), 21; (5314), 482
Sarney, T. S., and Hamand, A. S. (2287), 64
Sauer, A. (7881), 511
Scales, E. A. (15344), 406
Schanschieff, A. (5202), 387
Scott, G. B. (7694), 557
Sebass, O., Haenichen, F., and Haenichen, O. (13453), 64; (13451), 222
Sellars, J. C. (3004), 154
Sellon, J. S. (1764), 84
,, ,, and Sellon, R. P. (3525), 386
Shalders, H. C. B., and Thorman, A. J. (7733), 533
Siemens and Halske (7143), 483
Skinner, W., Farquharson, J., and Lane, D. W. (14891), 262
Smith, J. J. C. (5828), 406
Smith, M. H. (1701), 131; (5627), 557
,, T. Tayler (4993), 458; (4992), 557
Snyers, R. (1870), 153
Sprague, F. J. (3358), 64; (3446), 405; (4468), 430; (5379), 458; (7312), 483
Stapleton, J. G. (4720), 510
Statter, J. G. (2985), 362; (5147), 510; (10540), 511
Stephen, J. (1101), 21
Stewart, G. W. (13668) 64
Stieringer, L., and Vail, J. H. (4771), 387
Street, C., and Maquaire, F. V. (9666), 221
Sutton, G. D. (12851), 64
Swan, A. (3625), 363; (4688), 387
,, J. W. (2271), 289
Swinburne, J. (3805), 430; (3941), 533
,, ,, and Evershed, S. (3942), 430
Swinton, A. Campbell (8122), 577
Symons, W. (2747), 64

TASKER, W. H. (8627), 201
Taund-Szyll, Baron von (1444), 42
Thompson, W. P. (13279. Communicated by E. A Müller, of Germany), 84
,, ,, (15078. Communicated by J. R. Burdick and D. H. Dorsett, of America), 289
,, ,, (3379. Communicated by C. Zipernowski and M. Deri, of Budapest), 362
Thompson, S. P. (4423), 405
Thorman, A. J., and Shalders, H. C. B. (7733), 533

UPWARD, A. R., and Pridham, C. W. (7461), 406; (9302), 511

VAIL, J. H., and Stieringer, L. (4771), 387
Vaughan, G. E. (12551. Communicated by the Austrian Small Arms Manufacturing Company, of Austria), 222
Vissière, L. (3467), 430

WALKER, F. (376), 20
,, S. F. (5006), 510
Webb, B. W., Jensen, H. P. F., and Jensen, J. (6118), 584
Williams, J. S. (4137), 363
Wilson, D. (5990), 482
Wise, W. L. (2834. Communicated by G. Edard, of Paris), 153
,, ,, (2833. Communicated by G. Edard, of Paris), 262
Woodward, H. (2845), 363
Wright, R., Allen, W. H., and Kapp, G. (2776), 289; (5123), 510
Wynne, F. (2325), 153; (12897), 154
,, W. R. (7373), 577

ZIPERNOWSKI, C., and Deri, M. (3379), 362

1886.

AIKEN, J. C., and Miles, W. H., jun. (2959), 604
Allison, H. J. (154. Communicated by Elihu Thomson, of America), 430
,, ,, (1354. Communicated by E. M. Gardner, of America), 431
,, ,, (1493. Communicated by W. L. Voelker, of America), 558
Andersen, F. O., and Foster, A. Le Neve, (932), 534

BERNSTEIN, A. (2080), 585
Bonta, J. W. (337), 430
Browett, C. (2317), 585

CARTER, J. W., Lathrop, F. La Otis, and Faber, C. (1151), 430
Clark, A. M. (4058. Communicated by the New Haven Clock Company, of America), 604
,, ,, (4072. Communicated by the New Haven Clock Company, of America), 604
Clarke, H. A. (3133), (3135), 604
Combettes, L. de (2081), 604
Cowles, E. H., and Cowles, A. H. (1161), (2403), 431
,, A. H. (1160), 558

FABER, C., Lathrop, F. La Otis, and Carter, J. W. (1151), 430
Foster, A., Le Neve, and Andersen, F. V. (932), 534

GARDNER, E. M. (1354), 431
Gilliland, E. T. (1310), 431
Gisborne, C. A. (2067. Communicated by F. N. Gisborne and D. H. Keeley, of Canada), 558
,, F. N., and Keeley, D. H. (2067), 558

HADDAN, H. J. (2403. Communicated by E. H. Cowles and A. H. Cowles, of America), 431

JARMAN, A. J. (2783), 585

KEELEY, D. H., and Gisborne, F. N. (2067), 558
Kessler, H. (2282), 585

LAKE, H. H. (2282. Communicated by H. Kessler, of Germany), 585
,, ,, (3726. Communicated by J. Serson, of America) 604
,, W. R. (337. Communicated by J. W. Bonta, of America), 430
,, ,, (3133. Communicated by H. A. Clark, of America), 604
,, ,, (3135. Communicated by H. A. Clark, of America), 604
Lathrop, F. La Otis, Carter, J. W., and Faber, C. (1151), 430
Lee, J. (2456), 585
Lichtenfeld, G. (2002), 534

MILES, W. H., jun., and Aiken, J. C. (2959), 604

NEW Haven Clock Company. (4058), (4072), 604
Neumann, H. (3670), 604

PARCELLLE, A. L. (3157), 604
Popplewell, W. W. (1151. Communicated by F. La Otis Lathrop, J. W. Carter, and C. Faber, of New York), 430

SERSON, J. (3726), 604

THOMPSON, W. P. (1161. Communicated by E. H. Cowles, and A. H. Cowles, of America), 431
,, ,, (1310. Communicated by E. T. Gilliland, of America), 431
,, ,, (1160. Communicated by A. H. Cowles, of America), 558
Thomson, E. (154), 430
Turnbull, W. C. (2652), 585

VOELKER, W. L. (1493), 558

WESTON, S. P. (993), 430
Whiteman, W. T. (2959. Communicated by W. H. Miles, jun., and J. C. Aiken, of New York), 604
Wilson, D. (2348), 585